

Assignment 2 : Q1: Report

Question 1 *Diffusion Tensor Magnetic Resonance Imaging*

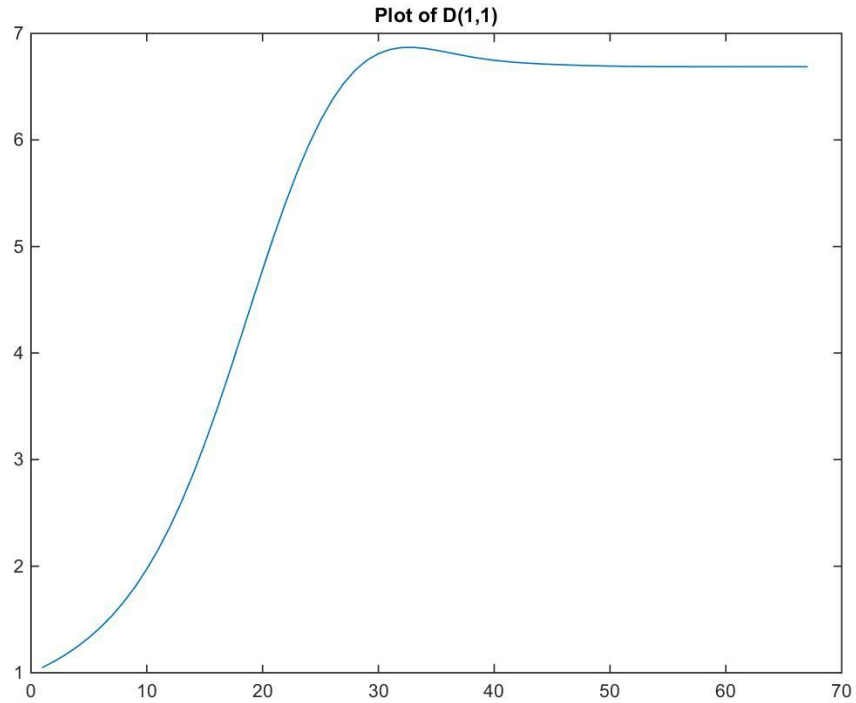
Part a

D matrix has been estimated using projected gradient descent. Code of the same can be found in 'code' folder of corresponding question.

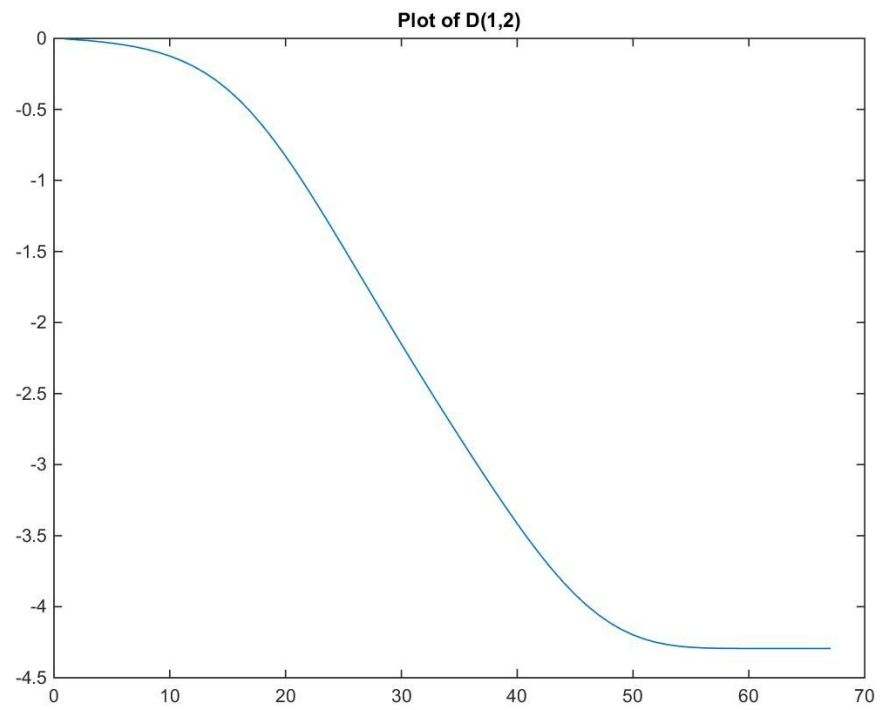
Entries of D are: $\begin{bmatrix} 6.6871 & -4.2941 \\ -4.2941 & 13.1410 \end{bmatrix}$

Plots of the sequences are as follows:

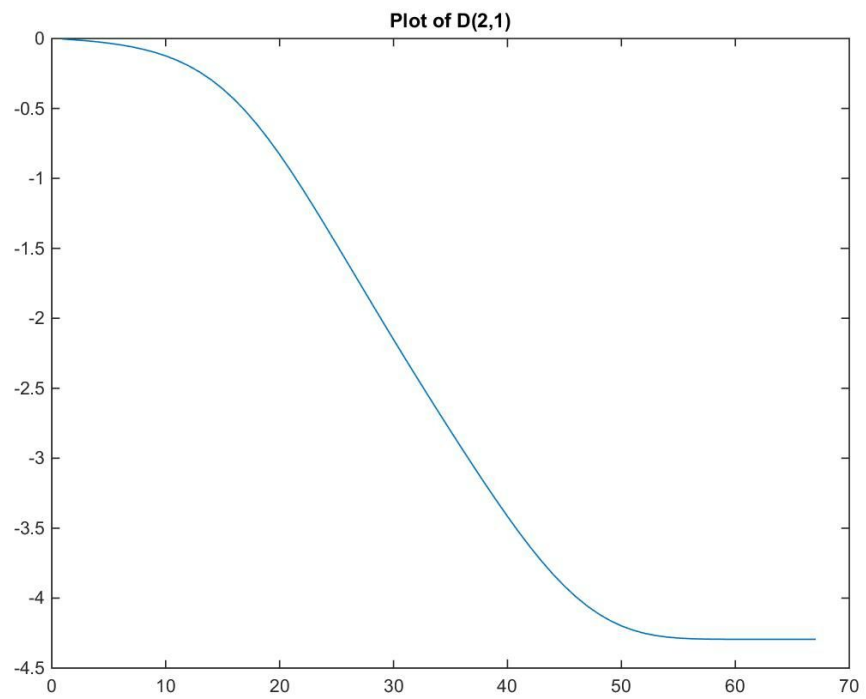
In all the below shown plots x-axis represent iteration number and y-axis represent value.

Description	Plot																		
D11	 <p>The plot, titled "Plot of D(1,1)", shows the value of the (1,1) element of the D matrix over 70 iterations. The x-axis represents the iteration number from 0 to 70, and the y-axis represents the value from 1 to 7. The curve starts at (0, 1) and rises steeply, reaching a plateau of approximately 6.7 around iteration 30, which remains constant until iteration 70.</p> <table border="1"><caption>Approximate data points for Plot of D(1,1)</caption><thead><tr><th>Iteration</th><th>Value</th></tr></thead><tbody><tr><td>0</td><td>1.0</td></tr><tr><td>10</td><td>2.0</td></tr><tr><td>20</td><td>4.5</td></tr><tr><td>30</td><td>6.7</td></tr><tr><td>40</td><td>6.7</td></tr><tr><td>50</td><td>6.7</td></tr><tr><td>60</td><td>6.7</td></tr><tr><td>70</td><td>6.7</td></tr></tbody></table>	Iteration	Value	0	1.0	10	2.0	20	4.5	30	6.7	40	6.7	50	6.7	60	6.7	70	6.7
Iteration	Value																		
0	1.0																		
10	2.0																		
20	4.5																		
30	6.7																		
40	6.7																		
50	6.7																		
60	6.7																		
70	6.7																		

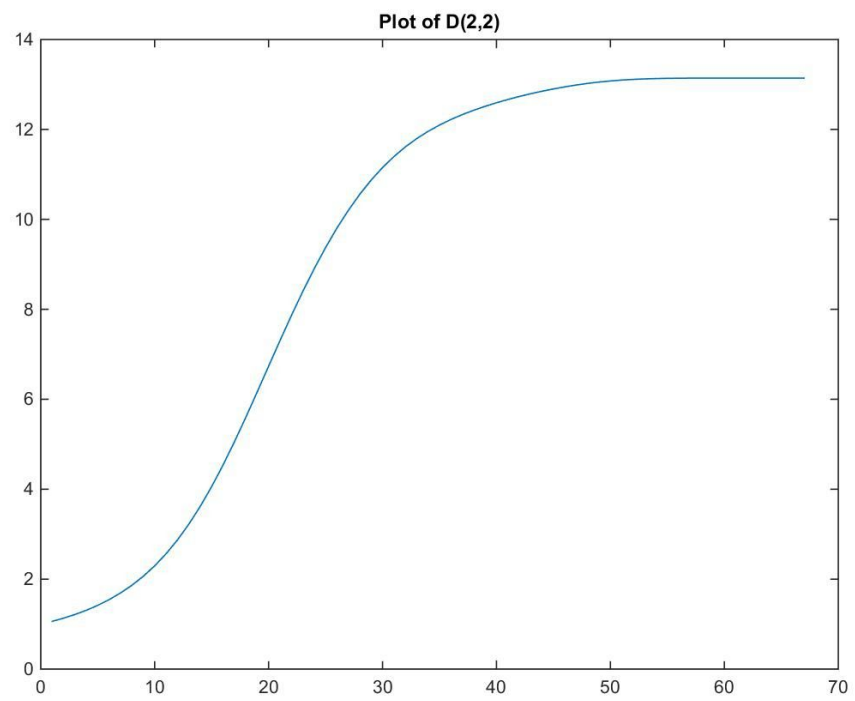
D12



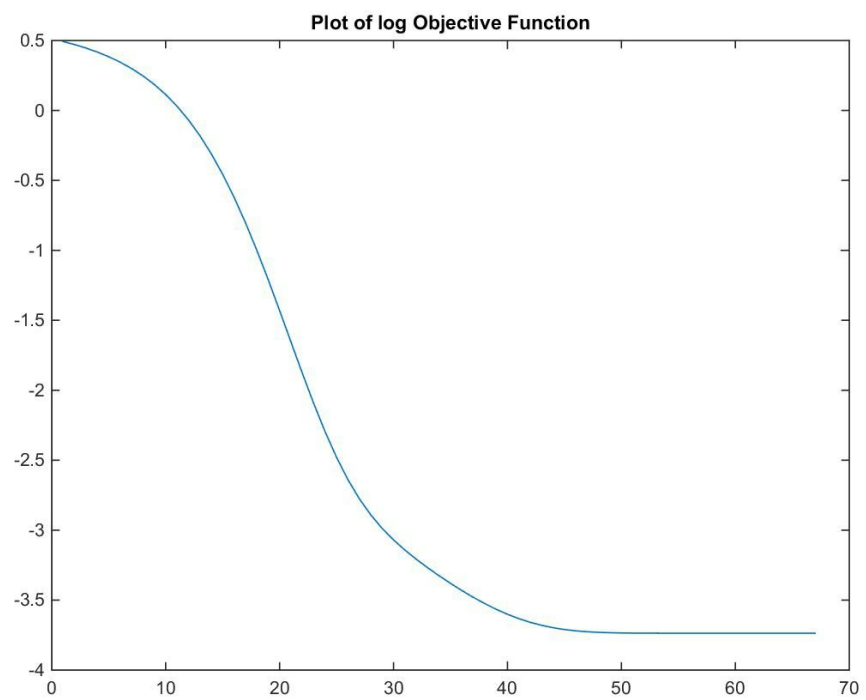
D21



D22



Objective
Function



Part b

Principal Direction of Diffusion: $[-0.4468, 0.8946]$

Part c

Multiplicative factor by which diffusion in principal direction is larger than non principal direction. : 3.3649